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In Re Application Of: NORBERT BUSCH ET AL  
Serial Number: 015,752  
Filed: February 27, 1979  
For: AN ETHER OF N-PROPANOL AMINE

Group Art Unit: 122  
Examiner: TOVAR

Sir:

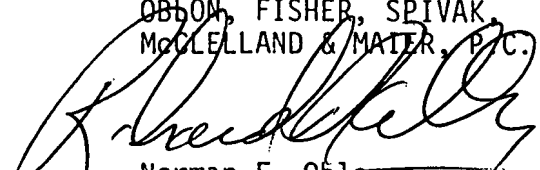
Attached hereto for filing are the following papers:

1. Appeal Brief (3 copies)

Our check in the amount of 50.00 is enclosed covering any required fees. In the event any variance exists between the amount enclosed and the Patent Office charges, please charge or credit the difference to our Deposit Account Number 15-0030. A duplicate copy of this sheet is enclosed for that purpose.

Respectfully submitted,

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NFO/trs

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#27757

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DATE OF THIS NOTICE		PATENT NUMBER	
X. . 81		Re 30577	
FORM PTO - 1031 (REV.) 9/79		U. S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	
NOTIFICATION		BALANCE OF ISSUE FEE DUE	
		15-0030	
<p>The total number of printed pages of specification in the enclosed patent exceeds the one page already paid for in the Base Issue Fee. The balance due is</p> <p>\$ <u>40</u> (minus \$10 paid with Base Issue Fee) = \$ <u>30</u></p> <p><b>PAYMENT OF THIS BALANCE MUST BE MADE WITHIN THREE (3) MONTHS FROM THE DATE SHOWN ABOVE.</b></p> <p>Failure to pay this balance within the time specified will result in lapse of the patent. To expedite processing, please use the attached form PTO - 1031C to transmit the fee. Where use of a Deposit Account is being authorized, both parts C and D of this form should be transmitted.</p> <p>By direction of the Commissioner.</p>			

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# United States Patent [19]

Busch et al.

[11] E

Re. 30,577

[45] Reissued Apr. 14, 1981

[54] ETHER OF N-PROPANOL AMINE

[75] Inventors: Norbert Busch, Loubeyrat; Jacques Simond, Chamalieres; André Monteil, Gerzat; Jacques Moleyre, Mozac; Roland Y. Mauvernay, Riom, all of France

[73] Assignee: Centre Europeen de Recherches Mauvernay, Riom, France

[21] Appl. No.: 15,752

[22] Filed: Feb. 27, 1979

## Related U.S. Patent Documents

Reissue of:

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Appl. No.: 336,357  
Filed: Feb. 27, 1973

## [30] Foreign Application Priority Data

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[51] Int. Cl.<sup>3</sup> ..... C07D 207/08

[52] U.S. Cl. .... 260/326.5 L; 260/326.5 R;  
424/248.56; 424/267; 424/274; 424/325;  
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564/384

[58] Field of Search ..... 260/326.5 L

[56]

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McClelland & Maier

[57]

## ABSTRACT

**[Ethers]** An ether of n-propanolamine, preparation thereof and **[their]** use in treatment of cardiovascular conditions.

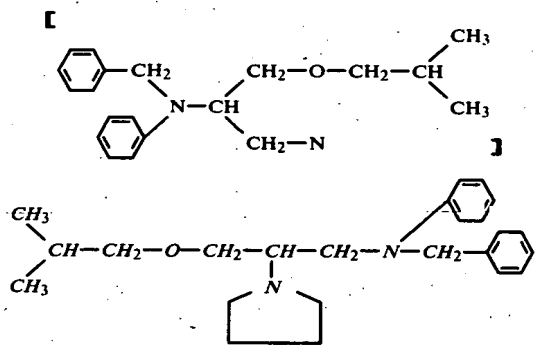
2 Claims, No Drawings



which [have] has previously been converted to [their] its sodium [derivatives] derivative by reaction with sodium amide, to obtain the [compounds] compound of the present invention.

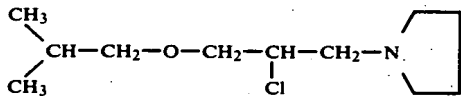
The invention also includes the addition salts of the [compounds] compound having the [general] formula I with pharmaceutically acceptable organic and inorganic acids such as hydrochloric acid and fumaric acid.

[As an] An example of the process of the invention [there] will now be described for the synthesis of [1-(3-isobutoxy-2-(phenylbenzyl)-amino)-propyl-pyrrolidino-hydrochloride (Compound No. 1).] 1-isobutoxy-2-pyrrolidino-3-N-benzylanilino propane hydrochloride (Compound 1).



#### First step

Preparation of 1-(3-isobutoxy-2-chloro)propyl pyrrolidine



345 ml of thionyl chloride dissolved in 345 ml of chloroform are added, drop by drop, to 275 g of 1-(3-isobutoxy-2-hydroxy)propyl-pyrrolidine dissolved in 350 ml of chloroform, while maintaining the temperature at approximately 45° C. The reaction mixture is heated to reflux until gas is no longer evolved. The chloroform

and the excess of thionyl chloride are removed under reduced pressure. The residue is poured on to 400 g of crushed ice. The reaction mixture is rendered alkaline with soda and the resulting mixture is extracted twice with 250 ml of diethyl ether. The combined ethereal extracts are dried over anhydrous sodium sulphate. After evaporation of the solvent the residue is distilled under reduced pressure: 220 g of product are obtained having the following properties:

Boiling point = 96° C./3 mm,  $n_D^{24} = 1.4575$ , Second step

#### Main product

23.4 g of sodium amide is added little by little to a solution of 92 g of N-benzylaniline in 500 ml of anhydrous xylene. The reaction mixture is then heated at 130° to 135° C. for 6 hours.

Whilst maintaining the temperature at 110° C., 110 g of the product of the first step dissolved in 150 ml of xylene is added and the product heated for 6 hours at 120° C.

The product having been allowed to cool to ambient temperature, 200 ml of cold water are added. The organic phase is separated and extracted with an aqueous solution of hydrochloric acid.

After twice washing with 100 ml of diethyl ether, the aqueous phase is made alkaline with 50% caustic soda solution. The liberated base is twice extracted with 150 ml of diethyl ether. After the ether has been evaporated, the residue is distilled under reduced pressure and has Bpt = 184° C./0.1 mm,  $n_D^{20} = 1.5538$ .

77 g of the pure base in the form of a viscous liquid is thus obtained.

The hydrochloride, which is prepared in conventional manner, has a melting point of 128° C.



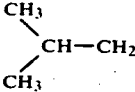



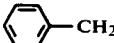
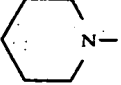
Analysis	C%	H%	N%
Calculated:	71.52	8.75	6.95
Found:	71.20	9.01	6.93

[Table I which follows sets out a series of products according to the present invention which were obtained using the foregoing method but substituting the appropriate intermediates containing the desired groups R and A and Ar and Ar<sup>1</sup> respectively.]

TABLE I

COM- POUND No.	Ar	Ar <sup>1</sup>	R	A	Melting Points of Salts °C.	ANALYSIS					
						C%		H%		N%	
						Theory	Found	Theory	Found	Theory	Found
1					Hydrochloride 128°	71.52	71.20	8.75	9.01	6.95	6.93
2					Fumarate 150°	67.08	66.90	7.66	7.20	8.69	8.75
3					Fumarate 98°	69.39	69.46	8.31	8.34	5.77	5.72
4					Fumarate 155°	68.16	68.42	7.32	7.30	6.35	6.31

[TABLE I-continued]

COM- POUND No.	Ar	Ar <sup>1</sup>	R	A	Melting Points of Salts °C.	ANALYSIS					
						C%		H%		N%	
						Theory	Found	Theory	Found	Theory	Found
5					Fumarate 195°	67.44	67.90	7.68	7.76	5.61	5.64
6					Hydro- chloride 133°	74.55	74.05	7.82	7.40	6.21	6.14

The pharmacological activity of the [compounds] compound of the invention in the cardiovascular field was determined on the dog in the manner described below:

An incision is made in the right-hand chest wall of an animal, which has been anaesthetised with chloralose and given artificial respiration, to enable the blood from the venus sinus to be drawn off and the apparatus required to record the following parameters to be inserted in position:

- Output of the coronary sinus;
- P<sub>O</sub><sub>2</sub> of the blood from the coronary sinus; and
- Amplitude of the contractions of the right ventricle.

At the same time there were also measured:

- Arterial pressure in a main carotid artery; and
- The rate of heart-beat determined cardiotaohometrically.

Table II which follows records the determinations made of the various parameters, the results being expressed as a maximum percentage variation relative to the pre-treatment values.

TABLE II

COM- POUND No.	DOSE mg/kg (intra- venous)	NUMBER OF ANIMALS	CORONARY OUTPUT %	RATE OF HEART-BEAT %	P <sub>O</sub> <sub>2</sub> %	ARTERIAL PRESSURE %	AMPLITUDE OF VENTRICULAR CONTRACTION %
1	2.5	7	+51.2	-28.6	+119.2	-39.8	-0.7
	5	7	+36.9	-31.8	+120.8	-40.2	-22.3
2	5	3	+55	-28	+71	-43	-25.5
3	5	4	+117.8	-19.2	+158	-30.5	-3
4	5	4	+110.5	-14.5	-56	-26	+17.5
5	5	3	+24	-3.5	+11.6	-15	+1.5

These results show that, taken as a whole, the [products] product under examination [have] has the ability to increase the output of coronary blood, to reduce the rate of heart beat and especially [with the exception of compound No. 4,] to increase the oxygen content of the venous cardiac blood. The latter action is demonstrated by an excess in the supply of oxygen relative to the requirements of the myocardium. The arterial pressure is also lowered for a short time. [In most cases there] There is little alteration in the ventricular inotropism.

Particular note should be taken [in the case of compound No. 1,] of the very considerable increase in the oxygen content of the venous cardiac blood in relation to the increase in coronary output, which may be simply attributed to the improved circulation of the blood. The extremely slow rate of heart-beat brought about by the products certainly plays an important role in this respect.

It then seemed interesting [using compound No. 1,] to seek the existence of an action on the  $\beta$ -adrenergic receptors in the manner outlined below:

A stimulating electrode was placed in position on the right stellar ganglion of dogs anaesthetised as described above and for which there were recorded:

- The arterial pressure,
- Ventricular inotropism (the amplitude of contraction of the right ventricle), and
- The rate of heart-beat.

The chest of the animals were not open and they were breathing freely.

The  $\beta$ -adrenergic receptors, both cardiac and vascular, were stimulated by electrical stimulation of the right stellar ganglion or by intravenous injection with isoprenaline (5  $\mu$ g/kg). The measurements were taken both before and after administration of compound No. 1 by the intravenous route in a dose of 5 mg/kg body-weight.

The following Table III gives the average percentage inhibition of the cardiovascular effects of isoprenaline and of the cardiac effects of the stimulation of the right

stellar ganglion.

TABLE III

	Number of Animals	Hypo- tension	Rate of Heart-beat	Positive inotropic effect
ISOPRENALINE [(5 $\mu$ g/kg)] (5 $\mu$ g/kg intravenous)	4	-54%	-32.7%	-46.5%
STIMULATION OF THE RIGHT STELLAR GANGLION	3		-30%	-21.3%

These results show that a partial inhibiting effect is achieved as regards the  $\beta$ -adrenergic receptors at the cardiovascular level of treatment.

In conclusion, it is apparent that the [members of the series of compounds possess] compound possesses a distinct cardio-vascular activity which is manifested by an improvement in circulation by the enhanced oxyge-

nation of the myocardium in consequence of a slow rate of heart-beat.

In addition to the general properties [of the compounds of the present invention,] compound No. 1 is also of interest in that it also possesses inhibiting effects with respect to the stimulation of the  $\beta$ -adrenergic receptors.

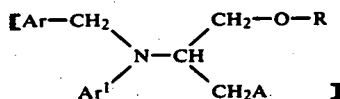
The pharmacological activities of [the compounds having the general formula] compound I thus [enable their] enables its application in human therapy to be anticipated, as [medicaments] a medicament intended for treating particularly:

Myocardiac anoxaemia,  
Coronary deficiencies, angina pectoris,  
Infarction of the myocardium, and  
Cardiac deficiencies associated with coronary circulatory trouble.

When admixed with the usual excipients, [they] it may be administered orally or rectally, in daily doses of between 100 and 800 mg.

What we claim is:

[1. An ether of n-propanolamine having the formula]



[wherein A is morpholino, pyrrolidino, piperidyl, and di-lower-alkyl amino, R is a straight or branched chain lower alkyl, or benzyl, Ar is aryl and Ar<sup>1</sup> is aryl or

pyridyl, and pharmacologically acceptable salts thereof.]

[2. The ether of claim 1 in which A is pyrrolidino, R is isobutyl and Ar and Ar<sup>1</sup> are both phenyl, and the hydrochloride thereof.]

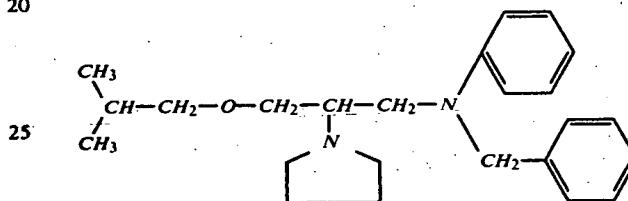
[3. The ether of claim 1 in which A is pyrrolidino, R is isobutyl, Ar is phenyl and Ar<sup>1</sup> is 2-pyridyl, and the acid fumarate thereof.]

[4. The ether of claim 1 in which A is diethylamino, R is an isobutyl and Ar and Ar<sup>1</sup> are both phenyl, and the acid fumarate thereof.]

[5. The ether of claim 1 in which A is morpholino, R is isobutyl and Ar and Ar<sup>1</sup> are both phenyl and the acid fumarate thereof.]

[6. The ether of claim 1 in which A is piperidyl, R is benzyl and Ar and Ar<sup>1</sup> are both phenyl and the hydrochloride thereof.]

7. An ether having the formula



and pharmaceutically acceptable acid addition salts thereof.

8. An ether according to claim 7 wherein the acid addition salt is the hydrochloride or the acid fumarate.

\* \* \* \* \*